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WHAT IS CLAIMED IS:

1. A multi-level digital data communication system including:
  - 5 at least one data communication device comprising means, responsive to instructional codes, for processing digital data messages having address codes and data codes and for routing said data messages,
  - 10 means for storing digital data messages coupled to said processing means,
  - 15 first means for communicating said data messages as first type radio frequency transmission signals, and second means for communicating said data messages as second type radio frequency transmission signals,
  - 20 said first and second radio frequency communication means being communicatively coupled to said processing means for selectively transmitting and receiving data messages to and from each of said first and second radio frequency communication means;
  - 25 at least one first type data terminal device comprising first communication means for communicating said data messages as said first type radio frequency transmission signals, and means, coupled to said first communication means of said data terminal device, for transducing data signals of data messages of communication between said at least one data communication device and said at least one first type data terminal device; and
  - 30 at least one data communication interface device comprising second means for communicating said data messages at said second type radio frequency transmission signals, and
  - 35

third means for communicating said data messages to a data station.

2. A communication system according to claim 1, wherein at least one data communication device is a portable device, further comprising:

5 a self-contained electrical power source electrically coupled respectively to said processing means, said storage means and said first and second radio frequency communication means.

3. A communication system according to claim 2, wherein said at least one portable data communication device further comprises means for receiving power from an external power source as an 5 alternative power source to said self-contained power source.

4. A communication system according to claim 2, wherein

5 said first radio frequency communication means of said at least one data communication device and of said at least one data terminal device are low power transceivers operable on a first channel over a first range, and

10 said second radio frequency communication means of said at least one data communication interface device and of said at least one communication device are high power transceivers operable on a second channel over a second range.

5. A communication system according to claim 4, wherein said at least one first type data terminal device is a plurality of first type data terminal devices, said plurality of first type data terminal devices being communicatively coupled via said low power transceivers operable on said first

channel upon becoming located within said first range.

6. A communication system according to claim 5, wherein each of said first data terminal devices further comprises means for processing said data messages having a first predetermined address code and data codes and for addressing data messages with a second predetermined address code in response to instructional codes, and means for storing digital data messages coupled to said processing means.

7. A communication system according to claim 6, wherein one of the group consisting of said plurality of first type data terminal devices communicatively coupled to a selected one of said data communication devices and said selected data communication device includes means for controlling communication among said low power transceivers operable within said first range from said selected one of said devices.

8. A communication system according to claim 7, wherein said means for controlling communication among said low power transceivers comprises means for storing program instructions, said program instruction storing means being coupled to the processing means of said one device, said program instruction storing means including stored instruction codes for selectively adding predetermined address codes to at least portions of received data messages and for directing said addressed portions to be re-transmitted as data messages through the low power transceiver of said one device.

9. A communication system according to claim 1, wherein:

5        said at least one first type data terminal device is a plurality of first type data terminal devices, at least one of said plurality of first type data terminal devices being communicatively coupled to each of said data communication devices via said first channel;

10        said second means of said at least one data communication interface device for communicating said data messages at said second type radio frequency transmission signals comprises

15        means for selectively addressing data messages to any of said plurality of data communication devices.

10. A communication system according to claim 9, wherein the plurality of data communication devices are portable devices, each further comprising:

5        a self-contained electrical power source electrically coupled respectively to said processing means, said storage means and said first and second radio frequency communication means.

11. A communication system according to claim 10, wherein

5        said first radio frequency communication means of said plurality of data communication devices and of said plurality of data terminal devices are low power transceivers operable on a first channel a first range, and

10        said second radio frequency communication means of said at least one data communication interface device and of said plurality of communication devices are high power transceivers operable on a second channel over a second range.

12. A communication system according to claim 11, wherein said at least one first type data

terminal device being communicatively coupled to each of said plurality of data communication devices  
5 is a plurality of the first type data terminal devices, said first type data terminal devices being communicatively coupled to the respective one of the data communication devices via said low power transceivers operable on said first channel upon  
10 becoming located within said first range of the respective one of said data communication devices.

13. A communication system according to claim 12, wherein each of said data terminal devices further comprises means for processing said data messages having a first predetermined address code and data codes and for addressing data messages with a second predetermined address code in response to instructional codes, and means for storing digital data messages coupled to said processing means.

14. A communication system according to claim 13, wherein a one of a group consisting of said plurality of first type data terminal devices communicatively coupled to a selected one of said data communication devices and said communication device includes means for controlling communication among said low power transceivers operable within said first range from said one of said devices.

15. A communication system according to claim 14, wherein said means for controlling communication among said low power transceivers comprises means for storing program instructions, said program instruction storing means being coupled to the processing means of said one device, said program instruction storing means including stored instruction codes for adding an address code to at least portions of received data messages and for directing said addressed portions for re-

transmission as data messages to the low power transceiver of said one device.

16. A communication system according to claim 15, further comprising a central data processing station, and said at least one data communication interface device further comprising means for 5 relaying data messages between said central data processing station and at least one of said data communication devices.

17. A data communication system comprising the combination of:

at least one first type data terminal device including

5 first means for communicating digital data messages having address codes and data codes at first type radio frequency transmission signals, and

10 means, coupled to said first radio frequency communication means of said data terminal device, for transducing data signals; and

a data communication device including

15 first means for communicating data messages at said first type radio frequency transmission signals, said first radio frequency communication means of said data communication device and said first radio frequency communication means of said at least one data terminal device constituting a radio frequency communication link between said at least one data terminal device and said data communication device,

20 25 means, communicatively coupled to said first radio frequency communication means of said communication device, for processing data messages and including,

means responsive to instructional codes  
and to predetermined ones of the address codes  
30 for routing data messages to said first radio  
frequency communication means of said  
communication device for communication over  
said link to said at least one data terminal  
device,

35 means, coupled to said processing means,  
or storing digital data including processed  
digital data and digital data messages, and  
second means for communicating data messages at  
second type radio frequency transmission  
40 signals, said second radio frequency  
communication means being communicatively  
coupled to said processing means.

18. A communication system according to claim  
17, wherein said transducing means of said at least  
one first type data terminal comprises an input  
means for receiving instructional impulses of a  
5 first form from outside of the communication system  
and for translating said instructional impulses into  
digital electrical address and data codes.

19. A communication system according to claim  
18, wherein said receiving and translating input  
means comprises a magnetic card reader and the  
instructional impulses of a first form are magnetic  
5 data pulses to be translated by an electromagnetic  
transducer into digital electrical address and data  
codes.

20. A communication system according to claim  
18, wherein said receiving and translating input  
means comprises a photoelectric scanner including  
means for translating scanned indicia into digital  
5 electrical address and data codes.

21. A data communication system according to claim 20, wherein at least one first type data terminal device comprises means for communicatively coupling said scanner and said data terminal via a wireless communication link, the scanner comprising a self-contained power source enabling the scanner to be independently movable with respect to said data terminal device while operatively communicating data to said data terminal device.

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22. A data communication system according to claim 21, further comprising a holster for retaining said scanner, said holster comprising means for recharging said self-contained power source of said scanner.

23. A data communication system according to claim 21, wherein said scanner further comprises a display device and a keyboard.

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24. A data communication system according to claim 23, further comprising a holster for retaining said scanner, said holster comprising means for recharging said self-contained power source of said scanner.

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25. A communication system according to claim 17, wherein said transducing means of said at least one first type data terminal comprises an output means for receiving digital electrical address and data codes from within said communication system and for translating said address and data codes into instructional or visually discernible data identifiable from outside the communication system.

26. A communication system according to claim 25, wherein said receiving and translating output means comprises a bar code printer for printing bar code labels.

27. A communication system according to claim 25, wherein said receiving and translating output means comprises a visual display of alphanumerical data in human readable form.

28. A communication system according to claim 17, wherein said transducing means of said at least one first type data terminal comprises at least one input means for receiving instructional impulses from outside of the communication system and at least one output means for receiving digital electrical address and data codes from within said communication system and for translating said address and data codes into instructional or visually discernible data indicia.

29. A communication system according to claim 28, wherein said at least one data terminal device comprises a hand held terminal portion, a belt carried terminal portion and means for electrically and communicatively coupling said hand held portion to said belt carried terminal portion, said belt carried terminal portion supporting said first radio frequency communication means of said at least one data terminal device and further comprising a self contained power source, said self contained power source being electrically coupled to said first communication means and, through said electrical and communicative coupling means, to said hand held terminal portion.

30. A communication system according to claim 17, wherein said data communication device comprises means for couplingly receiving and engaging said at least one data terminal device, a first type power source coupled to and supplying electrical power to said first and second radio frequency communication means of said data communication device, said

processing means and said storing means, said data communication device further having contacts disposed adjacent said receiving and engaging means, said contacts being electrically coupled to said first type power source, and wherein said at least one data terminal device comprises a second type rechargeable power source coupled and supplying power to said first radio frequency communication means of said at least one data terminal device and to said means for transducing data signals, said at least one data terminal device further comprising external electrical contacts complementary to said contacts of said data communication device to establish electrical connection upon engagement of said at least one data terminal device with said data communication device, whereby said first type power source will be enabled to recharge said second type power source of said at least one data terminal device.

31. A communication system according to claim 30, wherein said transducing means of said at least one data terminal comprises at least one input means for receiving instructional impulses from outside of the communication system and at least one output means for receiving digital electrical address and data codes from within said communication system and for translating said address and data codes into visually discernible data indicia.

32. A communication system according to claim 31, wherein said data communication device includes means for attaching said data communication device to a belt of a user, and wherein said input and output means of said at least one data terminal device comprise a keyboard and an alphanumerical display.

33. A data communication device comprising:  
means responsive to instructional codes for  
processing digital data messages having address  
codes and data codes and for routing said data  
5 messages,  
means for storing digital data messages coupled  
to said processing means,  
10 first means for communicating said data  
messages at first type radio frequency transmission  
signals, and  
15 second means for communication said data  
messages at second type radio frequency transmission  
signals,  
said first and second radio frequency  
communication means being communicatively coupled to  
said processing means for selectively transmitting  
and receiving data messages to and from each of said  
first and second radio frequency communication  
means.

34. A data communication device according to  
claim 33, further comprising:  
a self contained electrical power source  
electrically coupled to said processing means, said  
5 storage means and said first and second radio  
frequency communication means.

35. A data communication device according to  
claim 34, further comprising means for controlling  
communication among a plurality of data terminal  
devices, said communication controlling means  
5 including means for storing program instructions,  
said program instructions storing means being  
coupled to the processing means of said selected one  
device, said program instructions storing means  
including stored instruction codes for adding  
10 selected address codes to at least portions of  
received data messages and for directing said

selectively addressed portions for re-transmission as data messages to a selected one of the first and second radio frequency communication means.

36. A method of communicating data messages including addresses codes, further instructional codes and data codes interactively by radio frequency transmission among data terminal devices in proximity of one another and to a remote host computer, the method comprising:

communicating data messages at a first radio frequency and at a low power level between any selected one of said data terminal devices and a predetermined controlling device;

reading and interpreting a sequence of the address codes and instructional codes of the data messages communicated at the first radio frequency to the predetermined controlling device;

15 based on an interpretation of the address codes  
and instructional codes of the data messages,  
selecting the data messages to be sent to first type  
transmitter for a low power level radio frequency  
transmission to a selected one of said data terminal  
20 devices; and

re-addressing the selected ones of said data messages received by said controlling device at said controlling device, communicating said re-addressed data messages by said controlling device selectively to a first type transmitter for a low power level radio frequency transmission to a selected one of said data terminal devices, and, upon interpretation of an address code that the data message is to be communicated to the remote host computer, selectively routing the data messages to a second type transmitter for a high power level radio frequency transmission to the selected remote host computer.

37. A method according to claim 36, wherein  
said controlling device is a communication device  
comprising said first type and said second type  
transceivers including said first type and second  
5 type radio frequency transmitters, respectively, and  
said means for controlling communication among said  
devices, and each of said data terminal devices  
includes a respective first type transceiver, said  
first type transceivers being operable to transmit  
10 and receive in said first radio frequency  
communications channel and said low power level, and  
said second type transceiver being operable to  
transmit and receive within a second channel  
different from said first channel and at a high  
15 power level, and wherein the remote host computer  
comprises a second type transceiver, the method  
further comprising:

communicating data messages within said second  
channel and said high power level between said  
20 transceiver of said remote host computer and said  
communication device, receiving selected ones of  
said data messages within said second channel and  
said high power level by said communication device,  
and re-transmitting said selectively received second  
25 radio frequency data messages within said first  
channel and said low power level to selected ones of  
said data terminals.

38. A method of communicating digital data  
messages between devices of a communication system,  
the devices of the system having transceivers  
capable of sending and receiving data messages,  
5 thereby rendering each device capable of becoming a  
data message originating device and a data message  
destination device of the communication system, the  
communication system of such devices including at  
least a plurality of first type data terminal  
10 devices, at least one first type communication

device, a second type data communication interface device and a data processing device communicatively coupled to said second type data communication interface device, the method comprising:

15 generating data message for communication from an originating device of said communication system to a destination device of said communication system;

20 communicating any data messages generated by said first type data terminal devices at a first communication level to said at least one first type data communication device;

25 communicating any data message originating from said data processing device through said data communication interface device and at a second communication level to said at least one first type data communication device;

30 re-addressing data messages received by said at least one first type data communication device to the respective destination device; and

35 communicating re-addressed data messages from said first type data communication device at said first communication level to the respective destination data terminal device, and at said second communication level through said data communication interface device to the destination data processing device.

39. A multi-level wireless communication system for facilitating user work operations, comprising:

5 (a) a remote data station at a remote location, the remote data station having a first wireless transceiver,

10 (b) a mobile data station at a work location closer to a work site than to the remote data station, the mobile data station having a second wireless transceiver adapted to communicate with the

first wireless transceiver, a third wireless transceiver, and local processor and memory means, and

15 (c) data terminal means for use at a work site by a user, said data terminal means having a fourth wireless transceiver adapted to communicate with the third wireless transceiver at the mobile data station,

20 (d) said data terminal means comprising a portable data terminal adapted to be at the work site with a user during the actual course of a work operation, and

25 (e) the local processing and memory means of the mobile data station being in addition to any processing and storing means adapted to be carried by a user during the course of an actual work operation, and providing, in addition to communication functions local data processing services at the work location for assisting the work 30 operation at the work site.

40. In a data communication system,

5 (a) a mobile data station at a work location in proximity to a work site, the mobile data station having a first wireless transceiver for data communication within a local area, and local processor and memory means having data processing power for assisting in a work operation at the work site,

10 (b) data terminal means for use at a work site by a user, said data terminal means having second wireless transceiver means adapted for wireless data communication with the first wireless transceiver at the mobile data station,

15 (c) said data terminal means comprising a torso mounted component adapted for mounting on the torso of the user so as to be readily carried by the user in a hands-free manner,

20 (d) said data terminal means further comprising a user carried and user directed data terminal component adapted to be oriented with movement of a user body part and controlled by a user in effecting a work operation at a work site, and

25 (e) means comprising said second wireless transceiver means for providing wireless data communication between said local processor and memory means said torso mounted component and said user carried and user directed component such that the data processing power of the local processor and 30 memory means can assist in a work operation at the work site.

41. In a data communication system:

5 (a) a mobile local data processing unit adapted to be carried by an individual person to a work location, said mobile local data processing unit having communication local processing and local memory means and a portable power supply for providing operating power to said communication, local processing and local memory means,

10 (b) plural portable data terminal means having respective individual power sources so that the respective data terminal means are separately transportable in conducting work operations in the vicinity of the mobile local data processing unit, and

15 (c) local wireless coupling means comprising wireless transceiver associated with the communication, local processing and local memory means, and carried with the respective portable data terminal means and respectively powered by the 20 portable power supply and the respective individual power sources, said respective portable data terminal means having respective transducers coupled with said communication, local processing and local

25 memory means by means of said local wireless coupling means so as to supply data to the communication local processing and local memory means,

30 (d) said communication, local processing and local memory means, in addition to its communication functions, having processing power to process the data from the respective transducers at the mobile local data processing unit for assisting the local work operations at the work location.

42. In a data processing system according to claim 41, said mobile local data processing unit having data output means powered by said portable power supply and providing visible output for assisting in the local work operations at the work location.

5 43. In a data communication system

5 (a) a mobile local data processing unit adapted to be transported to a work location and containing a mobile power supply of relatively high capacity so as to readily support communication and local data processing activities,

10 (b) plural portable data terminal means having respective individual power sources of relatively lower capacity and of weight suited to being carried by an individual user in conducting work operations in the vicinity of the mobile local data processing unit, and

15 (c) local wireless coupling means comprising a wireless transceiver associated with the mobile local data processing unit and powered by the mobile power supply, and respectively wireless transceivers associated with the respective portable data terminal means and powered by the respectively individual power sources, said respective portable data terminal means comprising respective data

transducers or wireless direct data coupling with the mobile local data processing unit for the interchange of data therewith independently of any higher order communication link associated with the  
25 mobile local data processing unit,

30 (d) said mobile local data processing unit having local processing and memory means providing, in addition to its communication processing functions in conjunction with the associated wireless transceivers and any higher order communication link, local processing power for interacting with the respective transducers so as to directly assist local work operations being conducted by means of the respective portable data  
35 terminal means.

44. In a data communication system according to claim 5,

5 said mobile local data processing unit having data output means powered by said mobile power supply of the mobile local data processing unit and adapted to provide direct support of work operations at the work location.

45. In a data communication system, a data collection and article tracking system comprising:

5 data collection means including means for recording weight and linear dimensions of an article in the form of electronic binary data, and including low power communication means for transmitting data messages including such binary data of weight and linear dimensions of the article;

10 printer means for printing machine readable labels and including low power communication means for transmitting control codes to the low power communication means of the data collection means and for receiving the transmitted data messages.

46. In a data communication system, the data collection and article tracking system of claim 45, wherein the printer means comprises a receptacle including contact means; the data collection and article tracking system further comprising:

5 a portable data collection terminal including a keyboard and a display screen and a low power communication means for sending and receiving data messages from the data collection means including the weight and linear dimension recording means and from the printer means, the portable data collection terminal having external surface terminals, the portable data collection terminal being insertible into the receptacle of the printer means, insertion 10 of the portable data collection terminal causing the low power communication means of the portable data collection terminal to become disabled during such insertion, the external surface terminals engaging 15 during the insertion of the data collection terminal into the receptacle the contact means of the receptacle, whereby the portable data collection terminal becomes communicatively coupled directly to the printer means to communicate data messages received by the printer means to the portable data collection terminal without use of the low power 20 communication system.

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47. In a data communication system, the data collection and article tracking system of claim 45, the printer means including communication control means for controlling communications among a plurality of the data collection means, the data collection and article tracking system further comprising a plurality of the data collection means.

48. In a data communication system, a data collection and article tracking system comprising:

5                   a first data terminal device including a low power communication transceiver, means for controlling low power communication among a plurality of data terminal devices each including a low power communication transceiver, and receptacle means for removably receiving a second data terminal device, the receptacle means including means for 10 communicatively contacting the second data terminal device to the first data terminal device upon insertion of the second data terminal device into the receptacle;

15                  a second data terminal device including a low power communication transceiver, and including external terminal means for communicatively contacting the communicative contacting means of the first data terminal device upon insertion of the second data terminal device into the receptacle of 20 the first data terminal device;

25                  means for deactivating the low power communication transceiver of the second data terminal device when the second data terminal device is inserted into the receptacle of the first data terminal device; and

                     at least one data collection device including a low power communication transceiver.

49. In a data communication system, the data collection and article tracking system according to claim 48 wherein the low power communication transceiver of the at least one data collection device linked to communicate with the second data terminal device when the second data terminal device is not inserted within the receptacle of the first data terminal device and linked to communicate with the first data terminal device when the second data terminal device is inserted into the receptacle of 5 the first data terminal device.

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50. In a data communication system, the data collection and article tracking system according to claim 48 wherein the at least one data collection device is at least one scanner.

51. In a data communication system, the data collection and article tracking system according to claim 48 wherein the at least one data collection device comprises at least one weight measuring device, the weight measuring device being communicatively coupled to the low power communication transceiver for communicating a measured weight.

52. In a data communication system, the data collection and article tracking system according to claim 48 wherein the at least one data collection device comprises at least one weight measuring device and at least one linear dimension measuring device, the weight measuring device having a measuring means coupled to the low power communication transceiver for communicating a measured weight, and the linear dimension measuring device having measuring means coupled to the low power communication transceiver for communicating a measured linear dimension.

53. In a data communication system, the data collection and article tracking system according to claim 48 wherein the first data terminal device is a printer device.

54. In a data communication system, the data collection and article tracking system according to claim 53 wherein the printer device comprises a further communication means for communicating data between the printer device and a host computer.

55. In a data communication system, the data collection and article tracking system according to claim 54 wherein the further communication means for communicating data between the printer device and a host computer is a high power transceiver for communicating over a high power communication system with the host computer.

56. In a data communication system, the data collection and article tracking system according to claim 54 wherein the further communication means for communicating data between the printer device and a host computer comprises means for coupling the printer device to a switched telephone network for communicating with the host computer.

57. In a data communication system, the data collection and article tracking system according to claim 53 wherein the second data terminal device is a portable data collection terminal having an elongate housing having top and bottom ends, a frontal side of the housing supporting a display screen and a keyboard, the keyboard including numerical keys and function keys, the rear side of the housing including a recessed handgrip configuration and a strap spanning the recess of the handgrip configuration.

10 58. In a data communication system, the data collection and article tracking system according to claim 57 wherein the at least one data collection device is at least one hand-held scanner.

59. In a data communication system, the data collection and article tracking system according to claim 58 wherein the at least one data collection device comprises a plurality of scanners, each

5 scanner being interactively linked to the printer device via the low power communication transceiver.

60. In a data communication system, the data collection and article tracking system according to claim 57, the numeric keys of the keyboard being disposed adjacent the display screen and the 5 function keys of the keyboard being disposed away from the display screen adjacent the bottom end of the elongate housing.

61. In a data communication system, the data collection and article tracking system according to claim 53, wherein the at least one data collection device comprises at least one weight measuring 5 device.

62. In a data communication system, the data collection and article tracking system according to claim 53, wherein the at least one data collection device comprises a weight measuring device and a 5 linear dimension measuring device.

63. In a data communication system, the data collection and article tracking system according to claim 53, wherein the second data terminal device is a hand-held data collection terminal having an 5 elongate housing including a handgrip configuration at a rear surface thereof and having a display screen at an upper surface thereof adjacent a top end of the housing and a keyboard disposed adjacent the display screen, the data collection terminal being removably insertible into the receptacle of 10 the printer device, thereby becoming communicatively coupled via the communicative contacting means and the external terminal means to the printer device, the at least one data collection device comprising a

15 weight measuring device and a linear dimension measuring device.

64. In a data communication system, the data collection and article tracking system according to claim 53, wherein the second data terminal device is a hand-held data collection terminal having an 5 elongate housing including a handgrip configuration at a rear surface thereof and having a display screen at an upper surface thereof adjacent a top end of the housing and a keyboard disposed adjacent the display screen, the data collection terminal 10 being removably insertible into the receptacle of the printer device, thereby becoming communicatively coupled via the communicative contacting means and the external terminal means to the printer device, the at least one data collection device comprising a 15 plurality of scanning devices, each scanning device interactively coupled to the data collection terminal and the printer device.